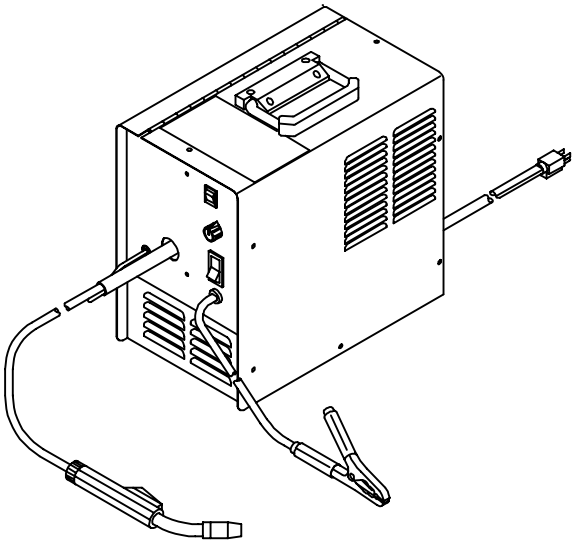
Miller®

Gold Seal™

March 1995 Form: OM-174 470
Effective With Serial No. KF842218

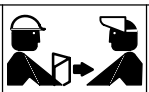
OWNER'S MANUAL



Gold Seal™ Model 420

- CV/DC Welding Power Source/Wire Feeder
- For FCAW And GMAW Welding
- 90 Amperes, 18 Volts At 20% Duty Cycle
- Uses 115 Volts AC, Single-Phase Input Power
- Overheating, Short-Circuit, And Motor Overload Protection
- Usable Range Of 30 To 130 Amperes
- Includes Gun, Welding Wire, And Gas Valve

- Read and follow these instructions and all safety blocks carefully.
- Have only trained and qualified persons install, operate, or service this unit.
- Call your distributor if you do not understand the directions.



- Give this manual to the operator.

- For help, call your distributor
- or: MILLER ELECTRIC Mfg. Co., P.O. Box 1079, Appleton, WI 54912 414-734-9821

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ARC WELDING SAFETY PRECAUTIONS

⚠ WARNING

ARC WELDING can be hazardous.

PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS KEEP AWAY UNTIL CONSULTING YOUR DOCTOR.

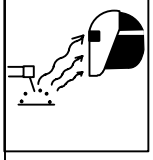
In welding, as in most jobs, exposure to certain hazards occurs. Welding is safe when precautions are taken. The safety information given below is only a summary of the more complete safety information that will be found in the Safety Standards listed on the next page. Read and follow all Safety Standards.

HAVE ALL INSTALLATION, OPERATION, MAINTENANCE, AND REPAIR WORK PERFORMED ONLY BY QUALIFIED PEOPLE.

ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

1. Do not touch live electrical parts.
2. Wear dry, hole-free insulating gloves and body protection.
3. Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
4. Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
5. Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
6. Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
7. When making input connections, attach proper grounding conductor first – double-check connections.
8. Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
9. Turn off all equipment when not in use.
10. Do not use worn, damaged, undersized, or poorly spliced cables.
11. Do not drape cables over your body.
12. If earth grounding of the workpiece is required, ground it directly with a separate cable – do not use work clamp or work cable.
13. Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
14. Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
15. Wear a safety harness if working above floor level.
16. Keep all panels and covers securely in place.
17. Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.



ARC RAYS can burn eyes and skin; NOISE can damage hearing; FLYING SLAG OR SPARKS can injure eyes.

Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Noise from some processes can damage hearing. Chipping, grinding, and welds cooling throw off pieces of metal or slag.

NOISE

1. Use approved ear plugs or ear muffs if noise level is high.

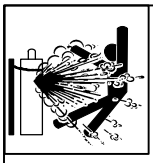
ARC RAYS

2. Wear a welding helmet fitted with a proper shade of filter to protect your face and eyes when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
3. Wear approved safety glasses with side shields.
4. Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.
5. Wear protective clothing made from durable, flame-resistant material (wool and leather) and foot protection.

FUMES AND GASES can be hazardous to your health.

Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

1. Keep your head out of the fumes. Do not breathe the fumes.
2. If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.
3. If ventilation is poor, use an approved air-supplied respirator.
4. Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instruction for metals, consumables, coatings, cleaners, and degreasers.
5. Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watchperson nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
6. Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
7. Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.



CYLINDERS can explode if damaged.

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

1. Protect compressed gas cylinders from excessive heat, mechanical shocks, slag, open flames, sparks, and arcs.
2. Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
3. Keep cylinders away from any welding or other electrical circuits.
4. Never drape a welding torch over a gas cylinder.
5. Never allow a welding electrode to touch any cylinder.
6. Never weld on a pressurized cylinder – explosion will result.
7. Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
8. Turn face away from valve outlet when opening cylinder valve.
9. Keep protective cap in place over valve except when cylinder is in use or connected for use.
10. Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

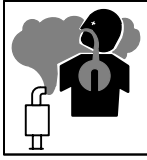
WELDING can cause fire or explosion.

Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.

1. Protect yourself and others from flying sparks and hot metal.
2. Do not weld where flying sparks can strike flammable material.
3. Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
4. Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
5. Watch for fire, and keep a fire extinguisher nearby.
6. Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
7. Do not weld on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to AWS F4.1 (see Safety Standards).
8. Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock and fire hazards.
9. Do not use welder to thaw frozen pipes.
10. Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
11. Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
12. Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.

⚠ WARNING

ENGINES can be hazardous.



ENGINE EXHAUST GASES can kill.

Engines produce harmful exhaust gases.

1. Use equipment outside in open, well-ventilated areas.
2. If used in a closed area, vent engine exhaust outside and away from any building air intakes.

ENGINE FUEL can cause fire or explosion.

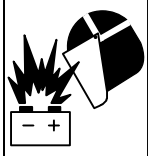
Engine fuel is highly flammable.

1. Stop engine and let it cool off before checking or adding fuel.
2. Do not add fuel while smoking or if unit is near any sparks or open flames.
3. Do not overfill tank – allow room for fuel to expand.
4. Do not spill fuel. If fuel is spilled, clean up before starting engine.

MOVING PARTS can cause injury.

Moving parts, such as fans, rotors, and belts can cut fingers and hands and catch loose clothing.

1. Keep all doors, panels, covers, and guards closed and securely in place.
2. Stop engine before installing or connecting unit.
3. Have only qualified people remove guards or covers for maintenance and troubleshooting as necessary.
4. To prevent accidental starting during servicing, disconnect negative (–) battery cable from battery.
5. Keep hands, hair, loose clothing, and tools away from moving parts.
6. Reinstall panels or guards and close doors when servicing is finished and before starting engine.



SPARKS can cause BATTERY GASES TO EXPLODE; BATTERY ACID can burn eyes and skin.

Batteries contain acid and generate explosive gases.

1. Always wear a face shield when working on a battery.
2. Stop engine before disconnecting or connecting battery cables.
3. Do not allow tools to cause sparks when working on a battery.
4. Do not use welder to charge batteries or jump start vehicles.
5. Observe correct polarity (+ and –) on batteries.

STEAM AND PRESSURIZED HOT COOLANT can burn face, eyes, and skin.

It is best to check coolant level when engine is cold to avoid scalding.

1. If the engine is warm and checking is needed, follow steps 2 and 3.
2. Wear safety glasses and gloves and put a rag over cap.
3. Turn cap slightly and let pressure escape slowly before completely removing cap.

PRINCIPAL SAFETY STANDARDS

Safety in Welding and Cutting, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami FL 33126

Safety and Health Standards, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, American Welding Society Standard AWS F4.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

Safe Practices For Occupation And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting And Welding Processes, NFPA Standard 51B, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

EMF INFORMATION

NOTE ☞

Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

The following is a quotation from the General Conclusions Section of the U.S. Congress, Office of Technology Assessment, *Biological Effects of Power Frequency Electric & Magnetic Fields – Background Paper*, OTA-BP-E-53 (Washington, DC: U.S. Government Printing Office, May 1989): ". . . there is now a very large volume of scientific findings based on experiments at the cellular level and from studies with animals and people which clearly establish that low frequency magnetic fields can interact with, and produce changes in, biological systems. While most of this work is of very high quality, the results are complex. Current scientific understanding does not yet allow us to interpret the evidence in a single coherent framework. Even more frustrating, it does not yet allow us to draw definite conclusions about questions of possible risk or to offer clear science-based advice on strategies to minimize or avoid potential risks."

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around the body.
4. Keep welding power source and cables as far away as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

About Pacemakers:

The above procedures are among those also normally recommended for pacemaker wearers. Consult your doctor for complete information.

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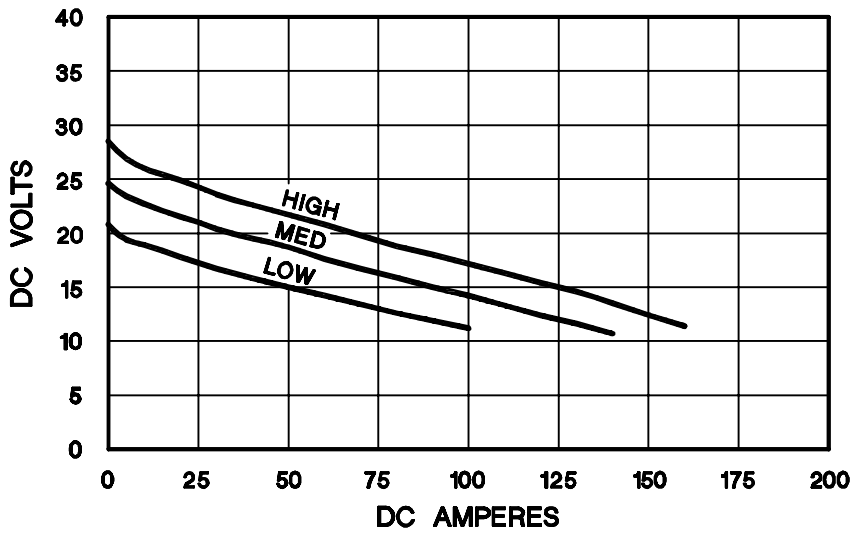
SECTION 1 – SPECIFICATIONS

Table 1-1. Welding Power Source

Specifications	Description
Type Of Output	Constant Voltage/Direct Current (CV/DC)
Rated Weld Output	90 Amperes, 18 Volts DC, 20% Duty Cycle
Type Of Input Power	Single-Phase; 60 Hz; At 115 Volts AC
Input Amperes At Rated Output	15 A
Input Amperes Used While Idling	0.592 A
KVA/KW Used At Rated Output	2.2 kVA/2 kW
KVA/KW Used While Idling	0.062 kVA/0.035 kW
Max. Open-Circuit Voltage	29 Volts DC
Control Circuit Voltage At Gun	24 Volts AC
Welding Processes	Flux Cored Arc (FCAW) And Gas Metal Arc Welding (GMAW)
Speed Range At No Load	220 To 750 ipm (5.6 To 19.1 mpm)
Wire Diameter Range	.023 To .035 in (0.58 To 0.89 mm)
Overall Dimensions	Length: 16-1/2 in (419 mm); Width: 9-1/2 in (241 mm); Height: 17 in (432 mm)
Weight	Net: 73 lb (33 kg); Ship: 80 lb (36 kg)
Welding Gun	
Rated Output (Air Cooled)	160 Amperes At 60% Duty Cycle Using CO_2 Shielding Gas
Cable Length	10 ft (3 m)

1-1. Volt-Ampere Curves



The volt-ampere curves show the minimum and maximum voltage and amperage output capabilities of the welding power source. Curves of other settings fall between the curves shown.

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Figure 1-1. Volt-Ampere Curves

1-2. Duty Cycle

⚠ CAUTION

WELDING LONGER THAN RATED DUTY CYCLE can damage unit or gun and void warranty.

- Do not weld at rated load longer than shown below.

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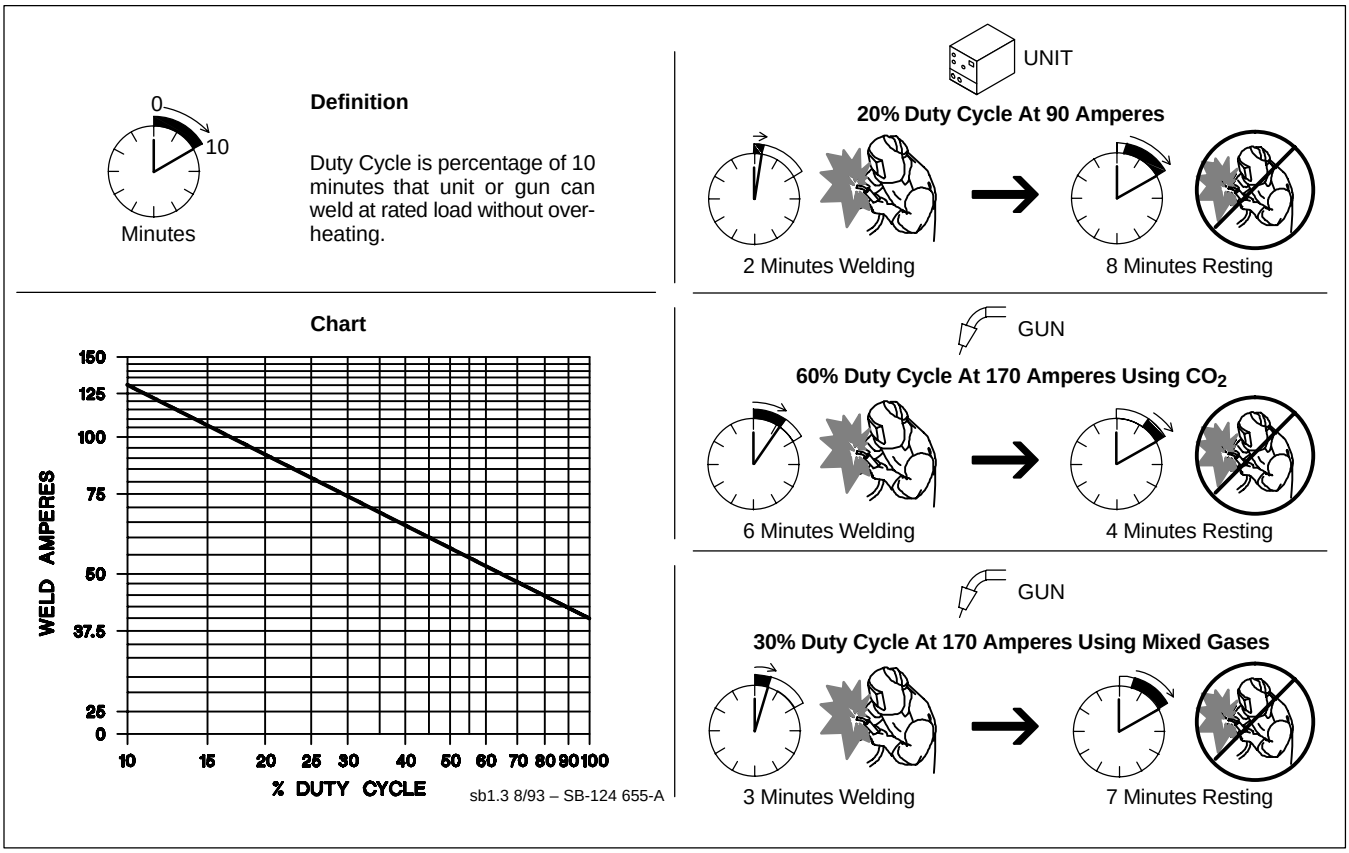

Figure 1-2. Welding Power Source Duty Cycle Chart

SECTION 2 – INSTALLATION

2-1. Installing Work Clamp

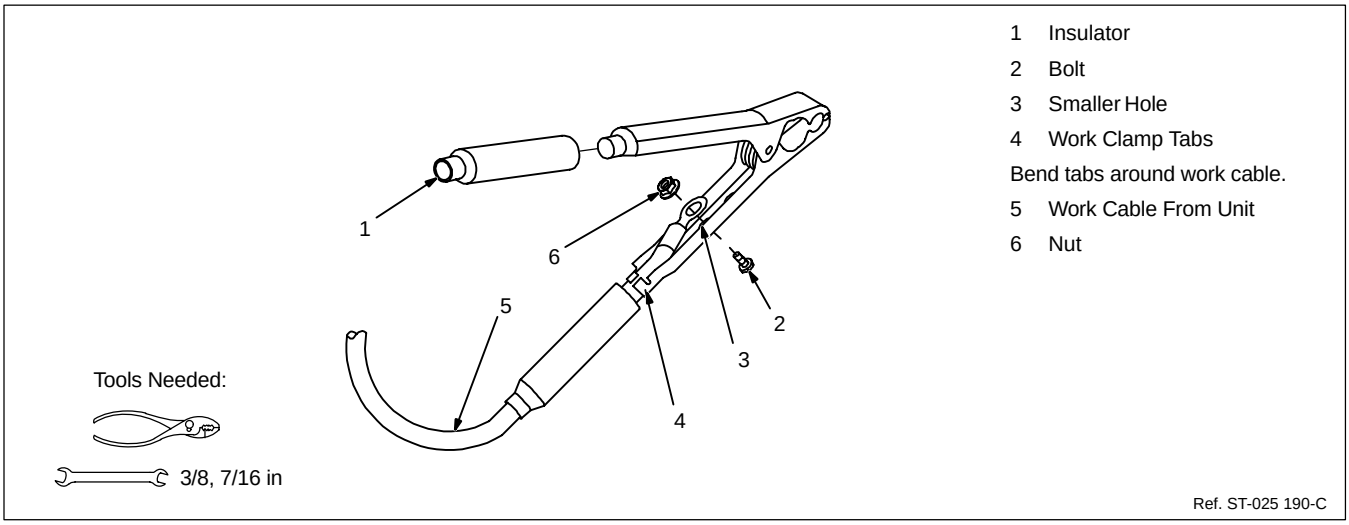

Figure 2-1. Installing Work Clamp

2-2. Gun Polarity For Wire Type

WARNING

ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Turn Off welding power source, and disconnect input power before inspecting or installing.

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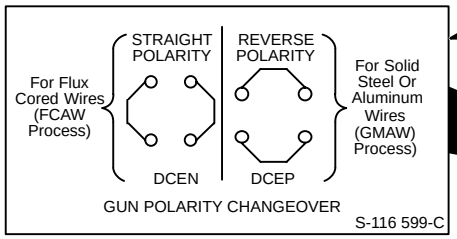
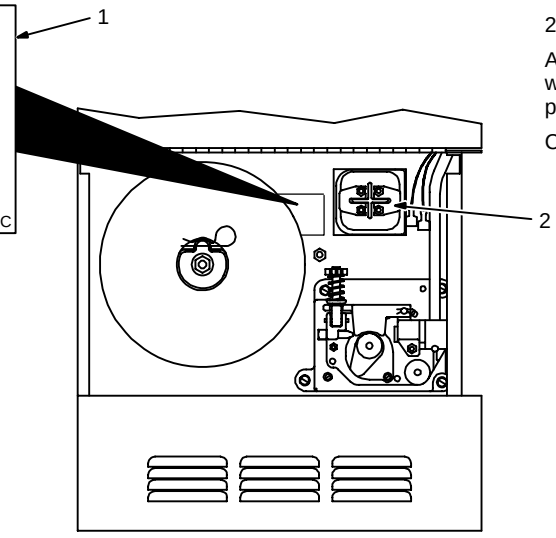




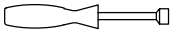
1 Polarity Changeover Label

2 Polarity Jumper Links

Always read and follow welding wire manufacturer's recommended polarity.

Close door.

Tools Needed:



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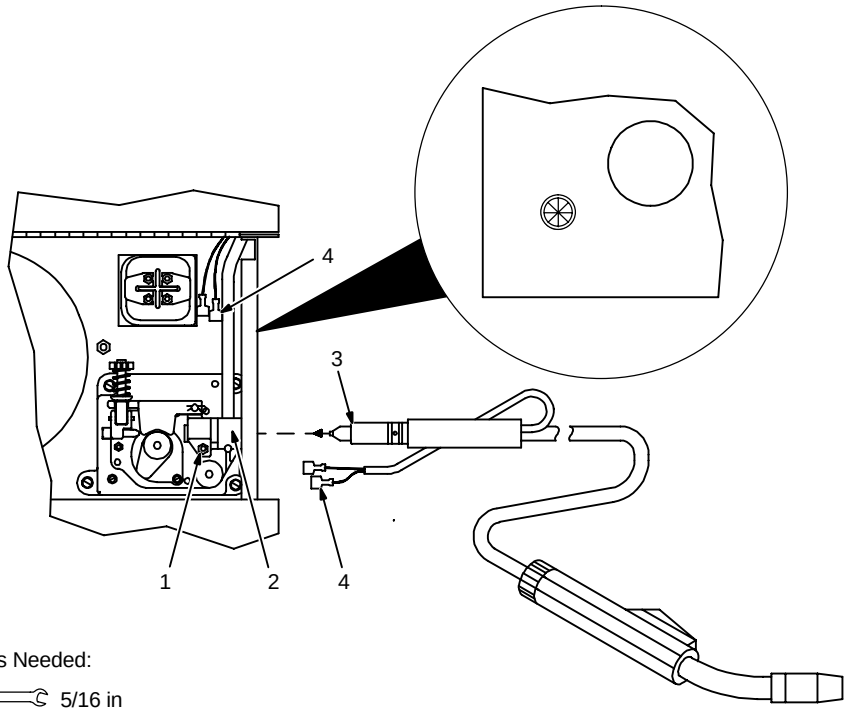
Ref. ST-159 619-A

Figure 2-2. Gun Polarity Connections

2-3. Installing Welding Gun



1 Gun Securing Nut

2 Drive Assembly

3 Gun End

Loosen securing nut. Insert gun end through front panel opening until it bottoms against drive assembly. Tighten nut.

4 Gun Trigger Leads

Insert leads, one at a time, through grommet on front panel. Connect leads to matching leads in unit.

Close door.

Tools Needed:

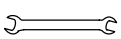


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Figure 2-3. Gun Connections

2-4. Connecting Input Power

Connect unit to a properly grounded 115 VAC receptacle of a 20 ampere individual branch circuit protected by time-delay fuses or circuit breakers. Select an extension cord of 12 AWG for up to 75 ft (23 m) or 10 AWG for up to 140 ft (46 m).

2-5. Threading And Feeding Welding Wire

⚠ WARNING

ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.

The welding wire, drive rolls, drive assembly, and all metal parts touching the welding wire are electrically live when welding or feeding wire using gun trigger.

HOT SURFACES can burn skin.

- Allow gun to cool before touching.

WELDING WIRE can cause puncture wounds.

- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people, or any metal when threading welding wire.

CYLINDERS can explode if damaged.

- Keep cylinders away from welding and other electrical circuits.
- Never touch cylinder with welding electrode.
- Always secure cylinder to running gear, wall, or other stationary support.

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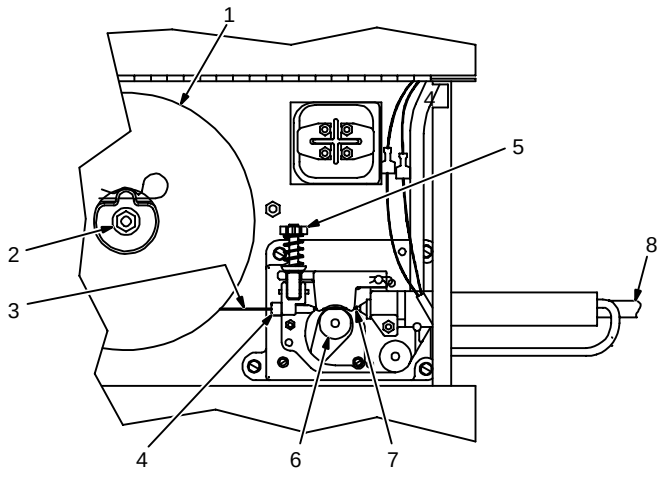


1 Wire Spool

2 Hub Tension Nut

Grasp spool. Turn while using wrench to adjust nut. When a slight force is needed to turn spool, tension is set.

3 Welding Wire

4 Inlet Wire Guide

5 Pressure Adjustment Knob

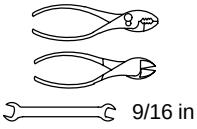
6 Drive Roll

7 Outlet Wire Guide

8 Gun Conduit Cable

Lay gun cable out straight.

Tools Needed:



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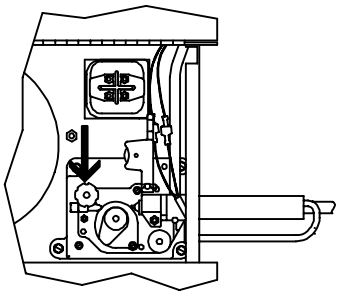
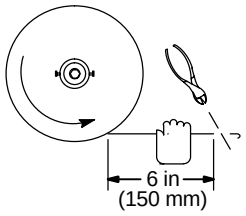
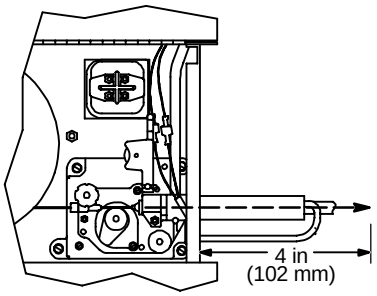


Open pressure assembly.

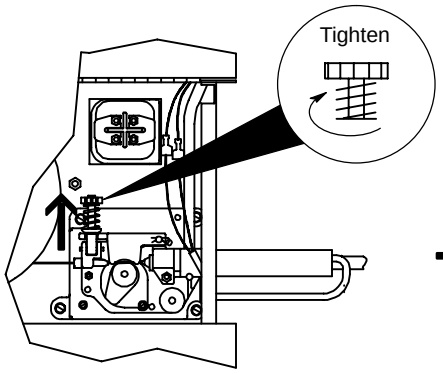
Hold wire tightly to keep it from unraveling.



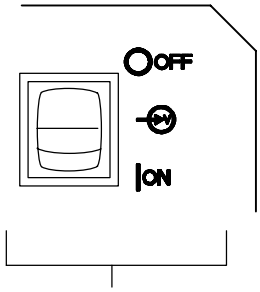
Pull and hold wire; cut off end.



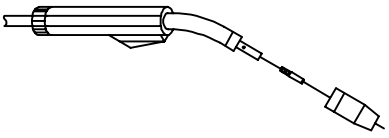
Push wire thru guides into gun; continue to hold wire.



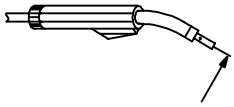
Close and tighten pressure assembly, and let go of wire.



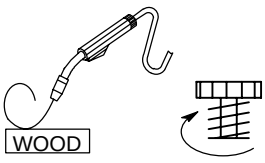
Set switch.



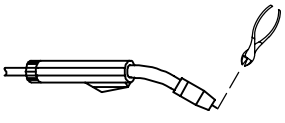
Remove gun nozzle and contact tube.



Press gun trigger until wire comes out of gun. Reinstall contact tube and nozzle.



Feed wire to check drive roll pressure. Tighten knob enough to prevent slipping.



Cut off wire. Close and latch door.

Ref. ST-161 157 / Ref. ST-159 615-A / Ref. ST-174 544 / S-0627-A

Figure 2-4. Feeding Welding Wire

2-6. Installing Gas Supply

⚠ WARNING

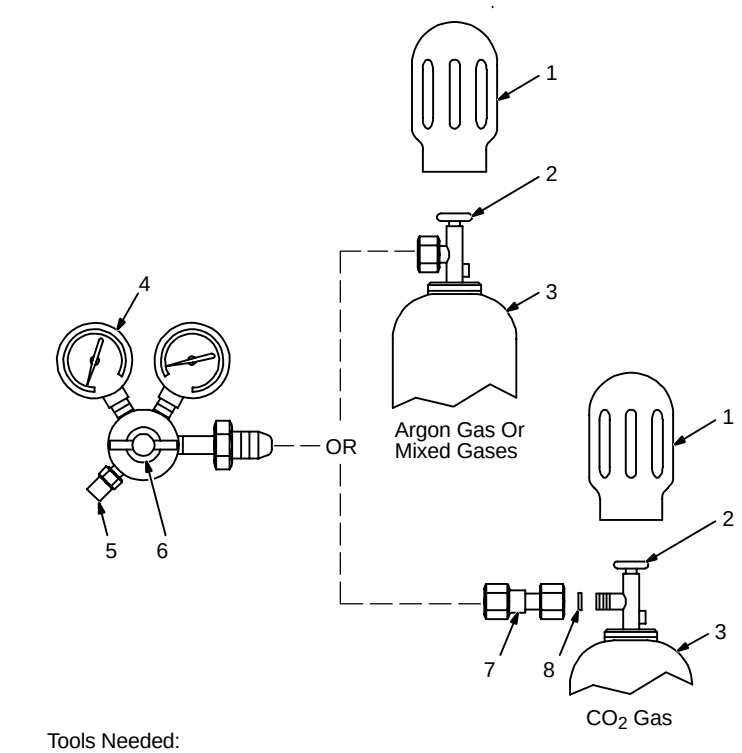
CYLINDERS can explode if damaged.

- Keep cylinders away from welding and other electrical circuits.
- Never touch cylinder with welding electrode.
- Always secure cylinder to running gear, wall, or other stationary support.

BUILDUP OF SHIELDING GAS can harm health or kill.

- Shut off shielding gas supply when not in use.

warn4.1 9/91



Tools Needed:

5/8, 1-1/8 in

Obtain gas cylinder and chain to running gear, wall, or other stationary support so cylinder cannot fall and break off valve.

1 Cap

2 Cylinder Valve

Remove cap, stand to side of valve, and open valve slightly. Gas flow blows dust and dirt from valve. Close valve.

3 Cylinder

4 Regulator/Flowmeter

Install so face is vertical.

5 Gas Hose Connection

Fitting has 5/8-18 right-hand threads. Obtain and install gas hose between regulator/flowmeter and welding power source.

6 Flow Adjust

Typical flow rate is 20 cfh (cubic feet per hour). Check wire manufacturer's recommended flow rate.

7 CO_2 Adapter

8 O-Ring

Install adapter with O-ring between regulator/flowmeter and CO_2 cylinder.

ssb3.1* 12/92 – ST-158 697-A / Ref. ST-149 827-B

Figure 2-5. Installation Of Deluxe Model Regulator/Flowmeter

SECTION 3 – OPERATION

⚠ WARNING

READ SAFETY BLOCKS at beginning of manual before proceeding.

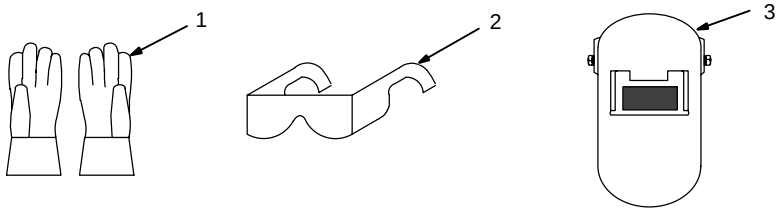
MOVING PARTS can cause injury.

- Keep away from pinch points such as drive rolls.
- Keep all doors, panels, covers, and guards closed and securely in place.

ARCING can damage switch.

- Do not change Thickness/Voltage switch position while welding.

Arcing inside switch can damage contacts, causing switch to fail.



Wear the following while welding:

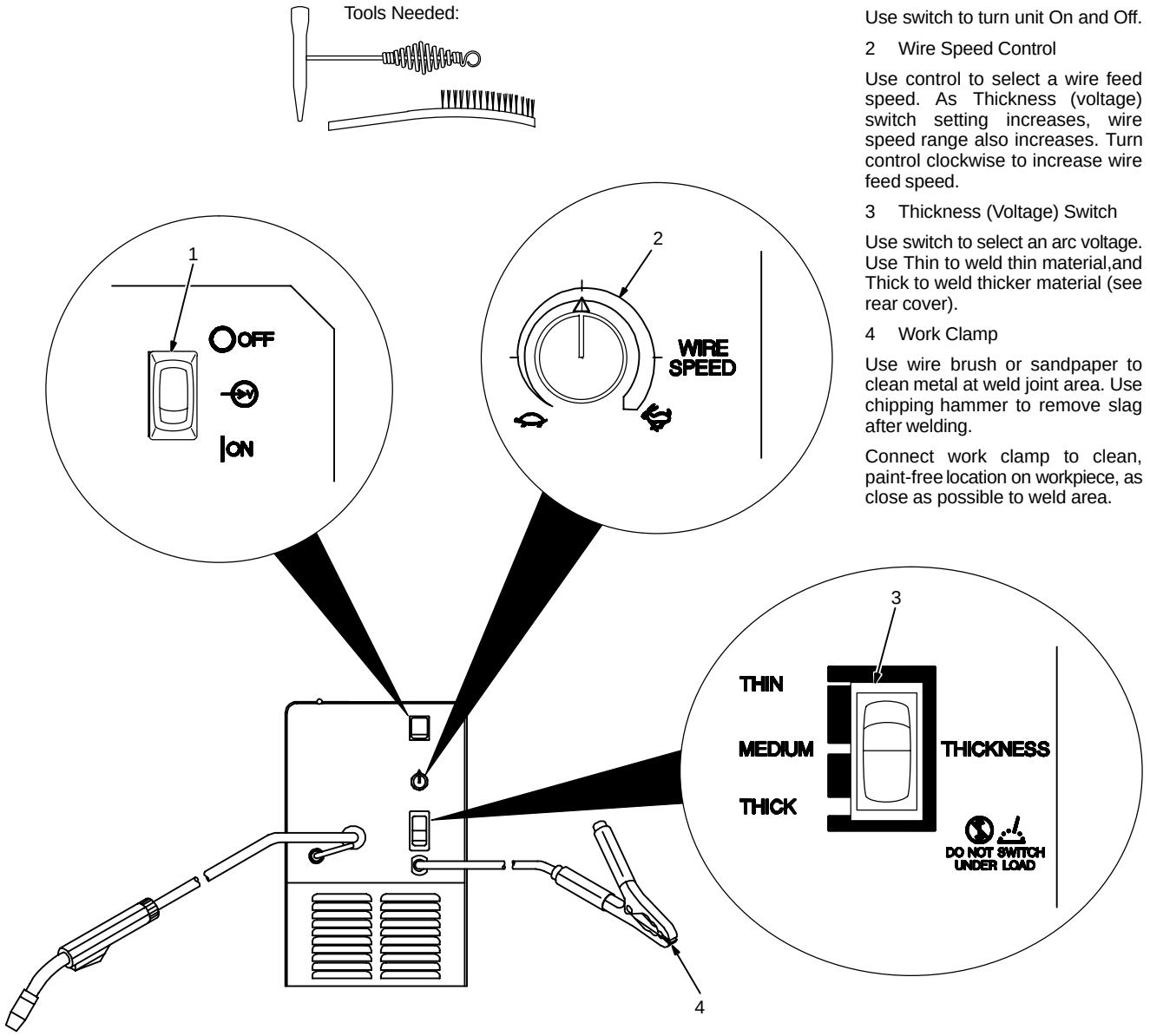
1 Dry, Insulating Gloves

2 Safety Glasses With Side Shields

3 Welding Helmet With Correct Shade Of Filter (See ANSI Z49.1)

sb3.1 1/94

Figure 3-1. Safety Equipment



1 Power Switch

Use switch to turn unit On and Off.

2 Wire Speed Control

Use control to select a wire feed speed. As Thickness (voltage) switch setting increases, wire speed range also increases. Turn control clockwise to increase wire feed speed.

3 Thickness (Voltage) Switch

Use switch to select an arc voltage. Use Thin to weld thin material,and Thick to weld thicker material (see rear cover).

4 Work Clamp

Use wire brush or sandpaper to clean metal at weld joint area. Use chipping hammer to remove slag after welding.

Connect work clamp to clean, paint-free location on workpiece, as close as possible to weld area.

Ref. ST-159 617 / Ref. ST-174 544

Figure 3-2. Controls

SECTION 4 – MAINTENANCE & TROUBLESHOOTING

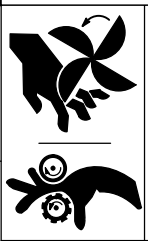
⚠ WARNING

ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Turn Off welding power source, and disconnect input power before inspecting, maintaining, or servicing.

HOT PARTS can cause severe burns.

- Allow cooling period before maintaining or servicing.



MOVING PARTS can cause injury.

- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.

Maintenance and troubleshooting to be performed only by qualified persons.

swarn8.2* 2/93

4-1. Routine Maintenance

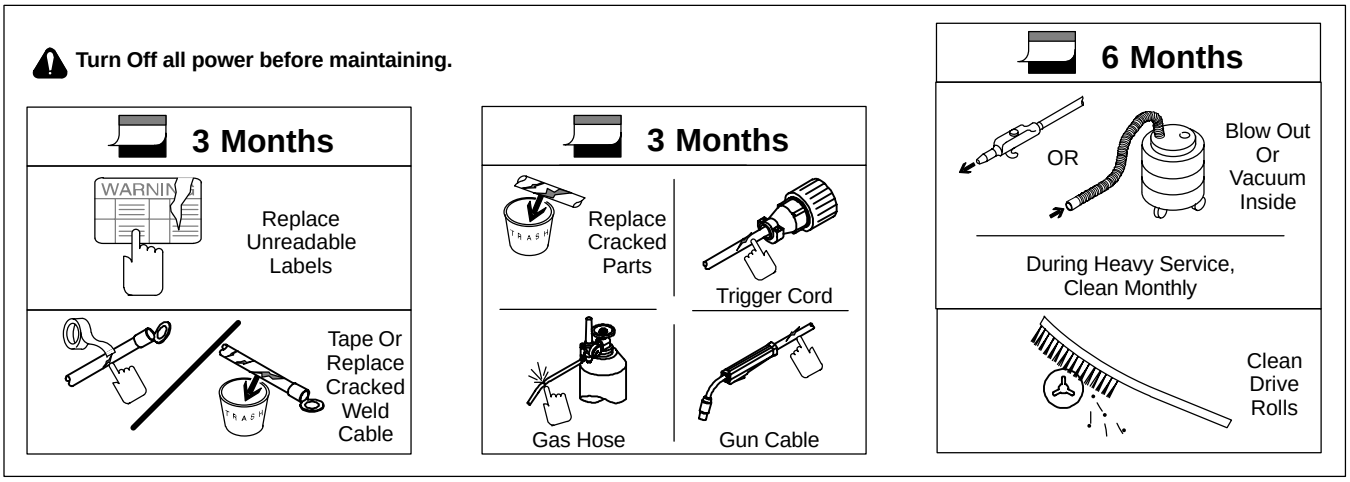


Figure 4-1. Maintenance Schedule

4-2. Overload Protection

WARNING **READ SAFETY BLOCKS at start of Section 4 before proceeding.**

A. Overheating

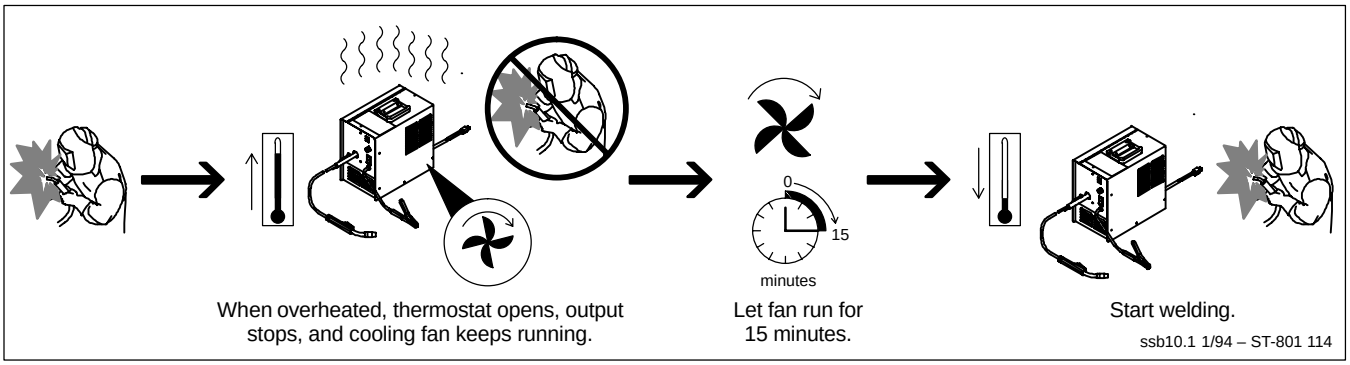


Figure 4-2. Overheating

B. Motor Fuse F1

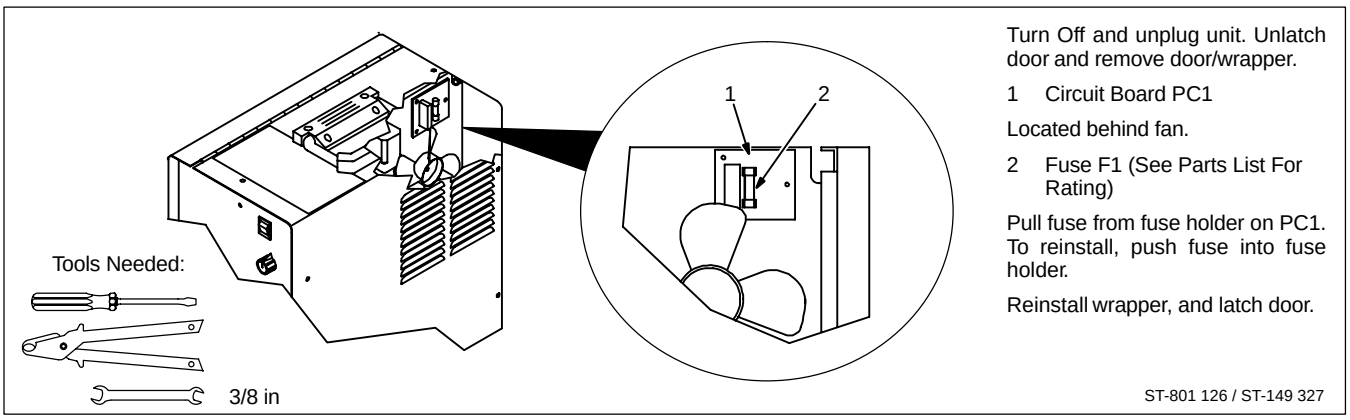
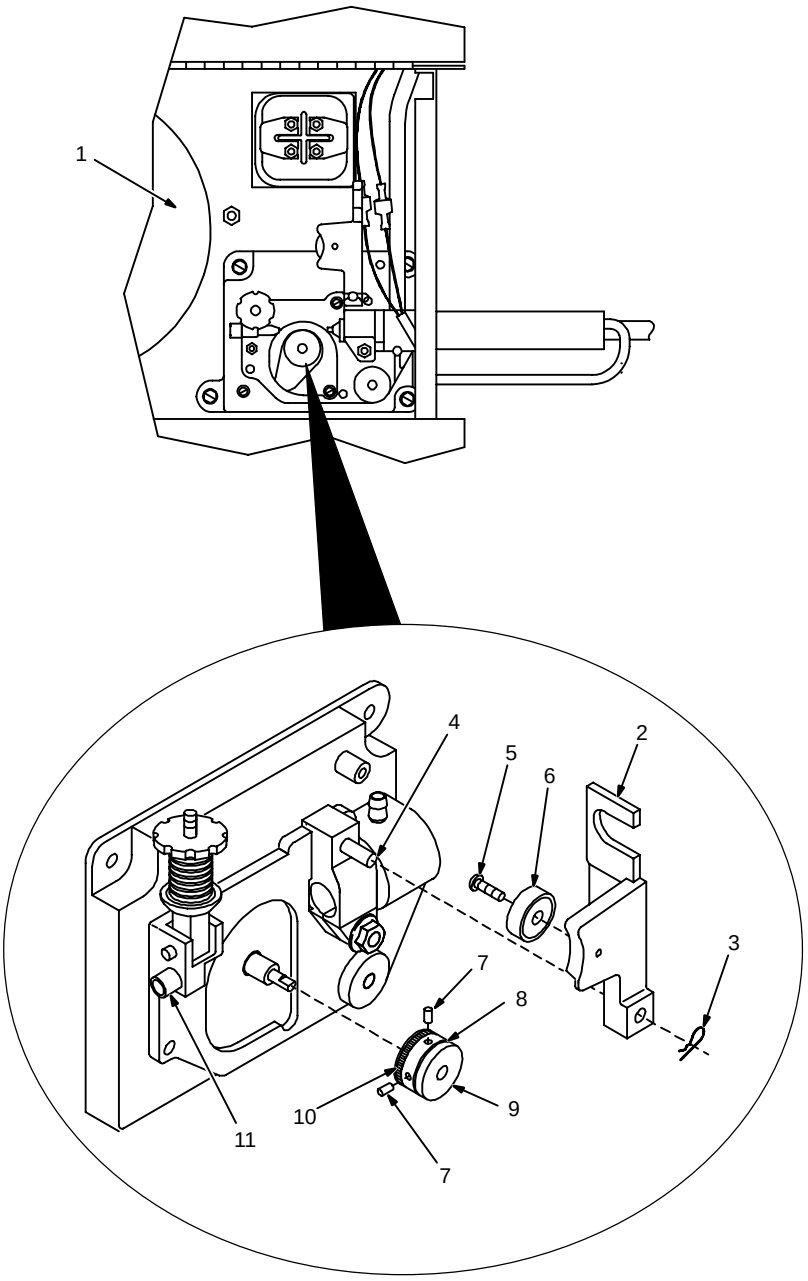

Tools Needed:
3/8 in
1
2
Turn Off and unplug unit. Unlatch door and remove door/wrapper.
1 Circuit Board PC1
Located behind fan.
2 Fuse F1 (See Parts List For Rating)
Pull fuse from fuse holder on PC1. To reinstall, push fuse into fuse holder.
Reinstall wrapper, and latch door.
ST-801 126 / ST-149 327

Figure 4-3. Fuse F1 Location

4-3. Drive Assembly Maintenance

⚠ WARNING **READ SAFETY BLOCKS at start of Section 4 before proceeding.**



Turn Off and unplug unit.

1 Wire Spool

Cut welding wire off at contact tip. Retract wire onto spool and secure.

2 Pressure Roll Arm

3 Cotter Pin

4 Pin

5 Screw

6 Bearing

Remove bearing as shown. Install new bearing and secure with screw. Reinstall arm onto pin and secure with cotter pin.

7 Setscrew

8 Smooth Groove For Hard Wire

9 Drive Roll

Remove drive roll as shown.

Use a wire brush to clean drive roll. Push drive roll onto shaft with desired groove in. Turn drive roll so one setscrew faces flat side of shaft, and tighten both setscrews.

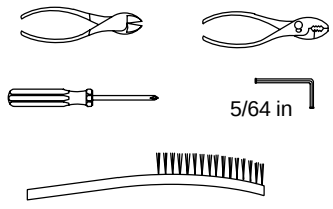
10 Knurled Groove For Flux-Cored Wire

11 Wire Inlet Guide

Remove guide by pressing on barbed area or cutting off one end near housing and pulling it out of hole. Push new guide into hole from rear until it snaps in place.

Thread welding wire (see Section 2-5). Close door.

Tools Needed:



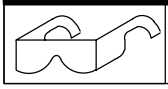
Ref. ST-159 615-A / ST-154 199

Figure 4-4. Drive Assembly Maintenance

4-4. Gun Maintenance

⚠ WARNING

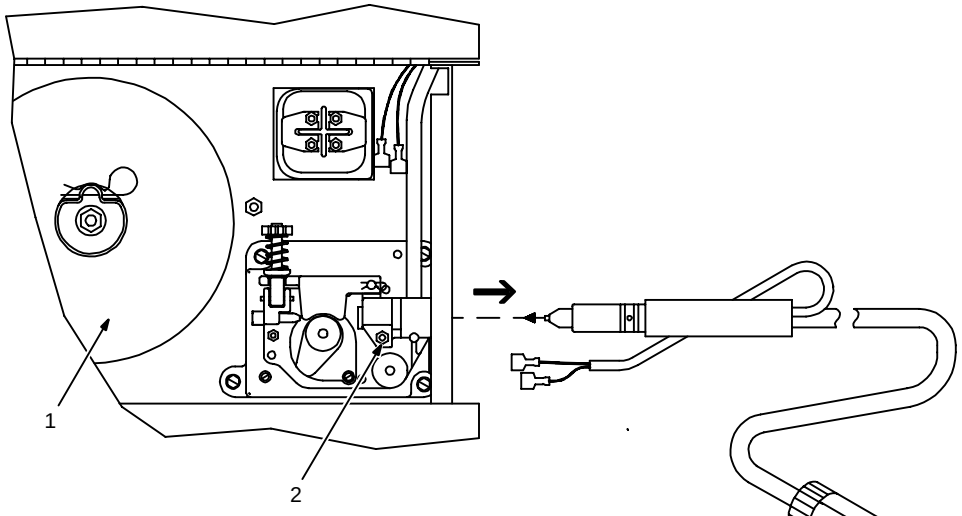
READ SAFETY BLOCKS at start of Section 4 before proceeding.



FLYING METAL CHIPS AND DIRT can cause injury and damage equipment.

- Point gun away from people and in a safe direction when blowing out with compressed air.

swarn10.1 10/91



Turn Off and unplug unit.

1 Wire Spool

Cut welding wire off at contact tip. Retract wire onto spool and secure.

2 Gun Securing Nut

Disconnect trigger leads. Loosen nut and remove gun and trigger leads.

3 Nozzle

4 Contact Tip

5 Head Tube

6 Liner Collet

Disassemble gun as shown.

7 Liner

Pull liner from this end. Blow gun casing out with compressed air.

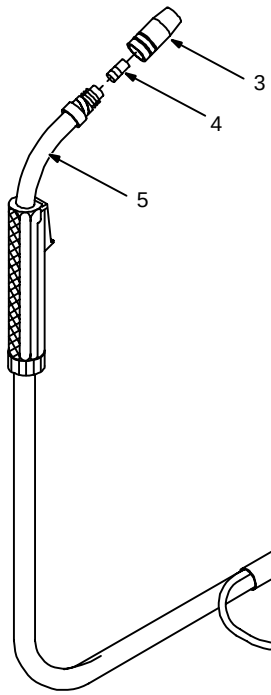
Insert new liner into gun casing until even with end of head tube.

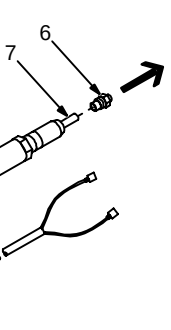
Install collet onto liner.

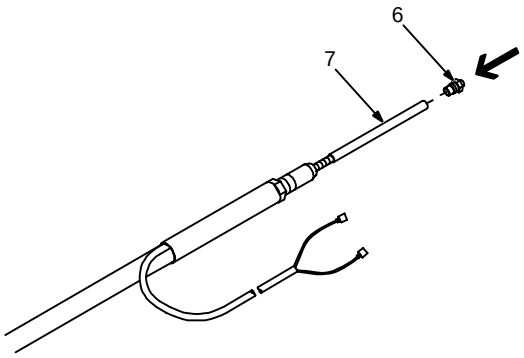
Install contact tip and nozzle.

Insert gun into feeder and mark where liner touches drive roll. Remove gun and cut liner off. Reinstall gun so that liner is as close as possible to drive rolls without touching.

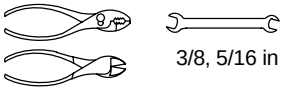
Thread welding wire (see Section 2-5). Close door.







Tools Needed:



3/8, 5/16 in

Ref. ST-159 619-A / Ref. ST-155 509

Figure 4-5. Gun Maintenance

4-5. Troubleshooting

⚠ WARNING

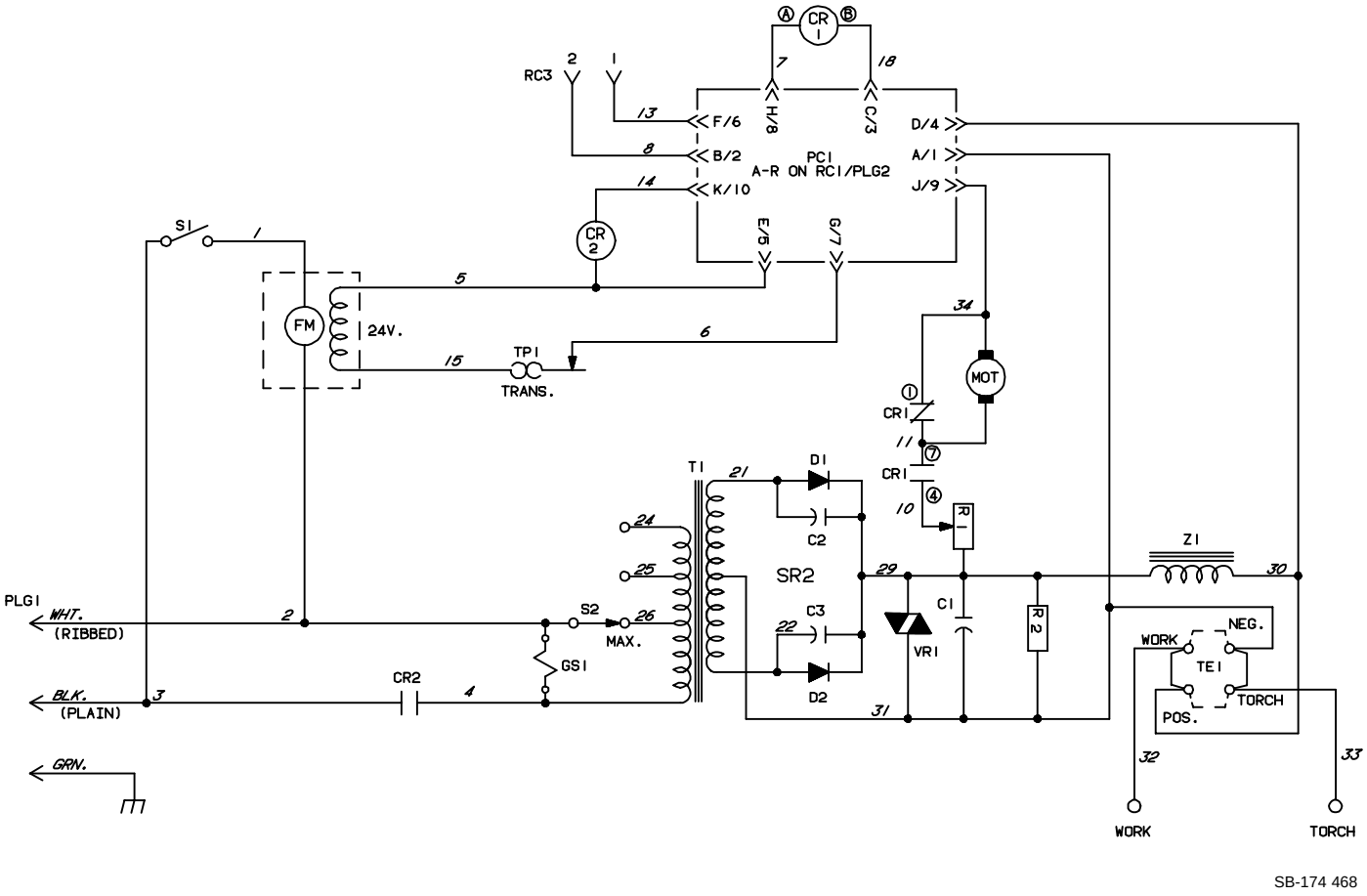
READ SAFETY BLOCKS at start of Section 4 before proceeding.

Table 4-1. Welding Trouble

Welding Trouble	Remedy	Section
No weld output; wire does not feed.	Secure power cord plug in receptacle.	2-4
	Check and replace motor fuse F1, if necessary.	4-2B
	Replace building line fuse or reset circuit breaker if open.	– –
	Secure gun trigger leads or repair leads, or replace trigger switch.	2-3
No weld output; wire does not feed; fan motor continues to run, and pilot light turns off.	Thermostat TP1 open (overheating). Allow fan to run; the thermostat will close when the unit has cooled.	4-2A
No weld output; wire feeds.	Connect work clamp to get good metal-to-metal contact.	Figure 3-2
	Check and replace contact tip, if necessary.	4-4
Low weld output.	Connect unit to proper input voltage or check for low line voltage.	2-4

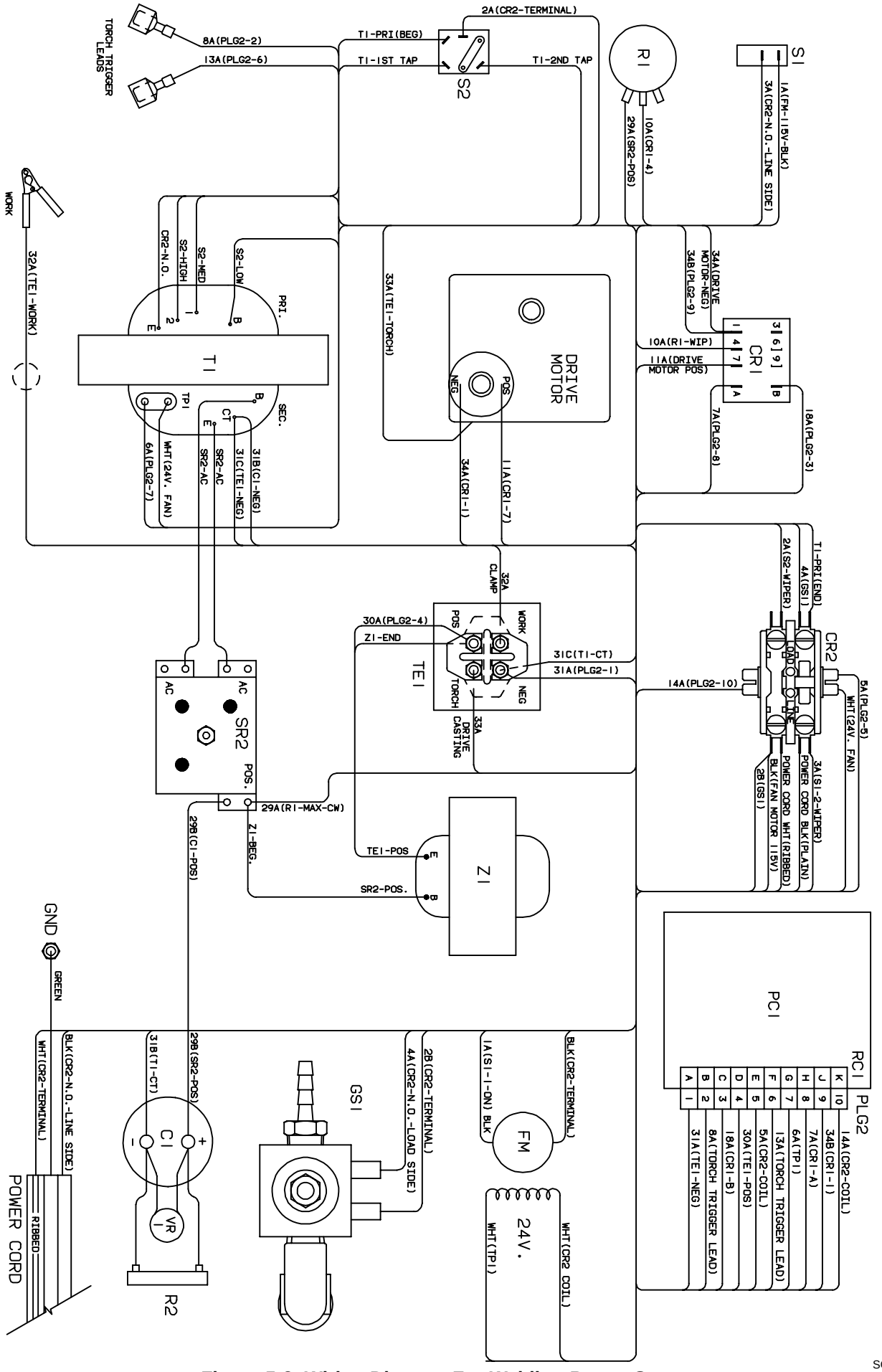
Table 4-2. Wire Drive/Gun Trouble

Wire Drive/Gun Trouble	Remedy	Section
Electrode wire feeding stops during welding.	Straighten gun cable and/or replace damaged parts.	4-4
	Adjust drive roll pressure.	2-5
	Readjust hub tension.	2-5
	Check and replace contact tip, if necessary.	4-4
	Clean or replace wire inlet guide or liner if dirty or plugged.	4-3, 4-4
	Replace drive roll or pressure bearing if worn or slipping.	4-3
	Secure gun trigger leads or repair leads, or replace trigger switch.	2-3
	Check and replace motor fuse F1, if necessary.	4-2B
	Check and clear any restrictions at drive assembly and liner.	4-3, 4-4
	Have nearest Factory Authorized Service Station check drive motor.	– –



SB-174 468

Figure 5-1. Circuit Diagram For Welding Power Source



SC-174 465

Figure 5-2. Wiring Diagram For Welding Power Source

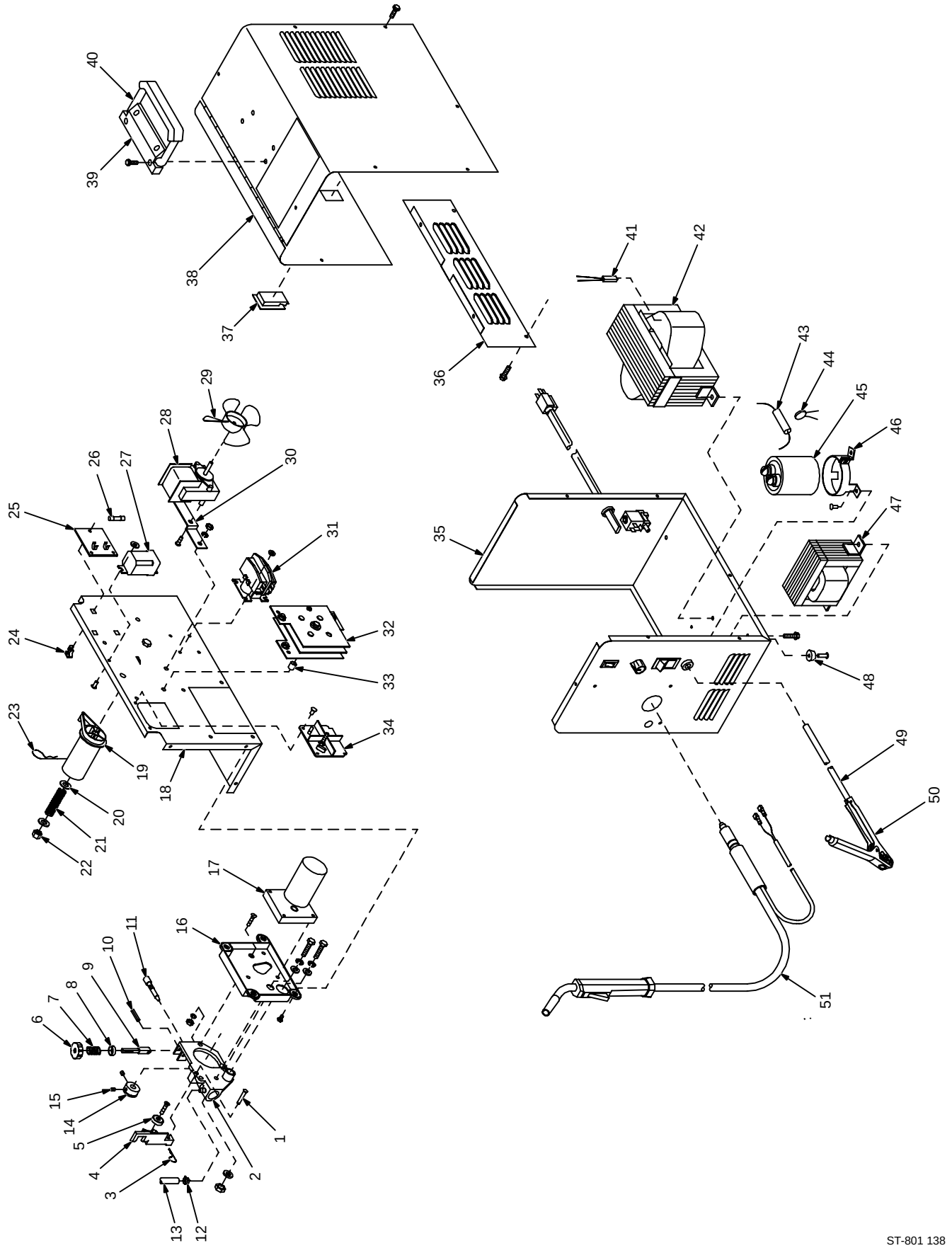


Figure 6-1. Main Assembly

Parts For Main Assembly

NOTE: All items indented by a dot(s) are included with the item listed directly above.

Item No.	Part No.	Description
	126 838	Drive Assembly
1	090 416	· Hinge Pin
2	124 817	· Drive Housing
3	151 828	· Cotter Hair Pin
4	112 031	· Pressure Lever
5	090 443	· Bearing
	111 622	· · Spacer
6	092 237	· Knob
7	090 415	· Spring
8	085 244	· Cupped Washer
9	085 242	· Fastener
10	010 224	· Spring Pin
11	058 549	· Wire Guide
12	149 332	Hose Clamp
13	147 635	Hose
14	119 028	Drive Roll
15	602 169	Set Screw
16	129 893	Insulator
17	124 506	Drive Motor
18	174 538	Baffle
19	111 929	Hub
20	010 910	Washer
21	073 355	Spring
22	010 909	Nut
23	111 998	Cotter Hair Pin
24	134 201	Stand-Off Support
25	119 539	Circuit Card

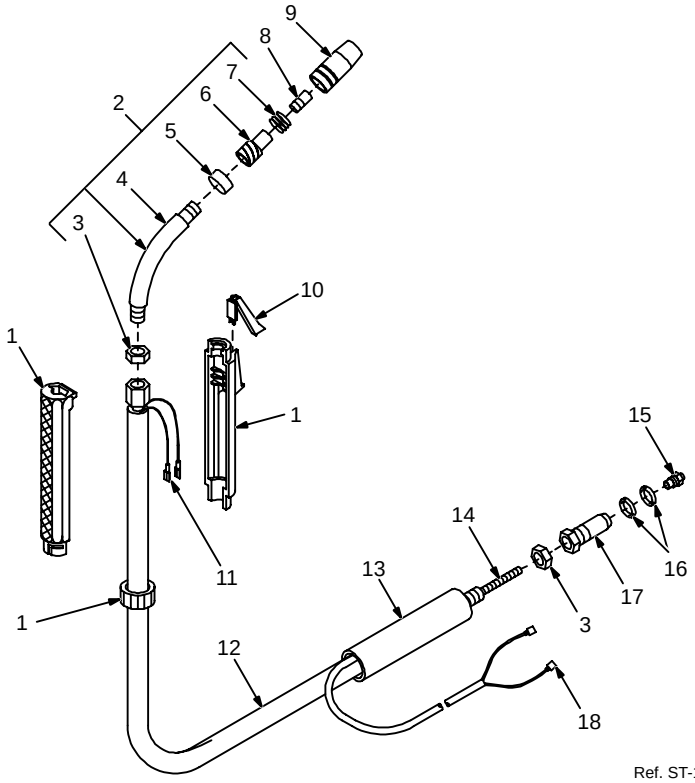
Item No.	Part No.	Description
26	*073 426	· Fuse, slo-blo 5A
	118 936	Housing, 10 pin
	079 747	Terminal
27	006 393	Relay
28	172 994	Fan Motor
29	005 656	Fan Blade
30	120 675	Bracket
31	129 696	Contactor
32	119 264	Rectifier
33	010 047	Tubing
34	122 385	Terminal Assembly
	038 618	· Link
35		Case w/Cmpts
	170 970	· Gas Valve
	147 545	· Cord Set
	111 443	· Bushing, cord set
	000 101	· Rheostat
	097 922	· Knob
	111 997	· Rocker Switch, SPST
	157 305	· Rocker Switch, DPDT
	174 535	· Case
	174 544	· Nameplate
	111 644	· Bushing, .875mtg
	025 338	· Bushing, .625mtg
36	157 187	Side Panel
37	089 899	Latch

Item No.	Part No.	Description
38	174 536	Wrapper
	134 327	· Warning Label
39	126 415	Clamp
40	126 416	Handle
41	125 552	Thermostat, NC
42	174 553	Transformer
	174 513	· Coil
43	117 116	Resistor
44	087 156	Varistor
45	109 039	Capacitor
46	108 105	Clamp
47	118 457	Stabilizer
48	019 663	Foot
49	600 325	Cable, (order by ft)
50	010 368	Clamp
51	119 697	GA-16C1 Gun, (Fig 6-2)
	026 843	Insulator, vinyl
	173 374	Regulator/Flowmeter
	174 869	Hose

*Recommended Spare Parts.

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

Be sure to provide Model and Serial Number when ordering replacement parts.



Ref. ST-110 832-D

Item No.	Part No.	Description
1	110 793	Handle Assembly
2	110 795	Head Tube
3	110 780	· Nut
4	110 779	· Jacket
5	110 781	· Stop
6	128 878	· Adapter
7	110 782	· Spring
8	110 786	Contact Tip, .030
8	110 787	Contact Tip, .035
9	110 789	Nozzle, 1/2 orf
9	♦112 420	Nozzle, 3/8 orf
9	♦110 790	Nozzle, flat spot
10	110 794	Trigger Switch Assembly
11	080 565	Terminal
12	110 792	Cable/Conduit
13	110 797	Sleeve
14	167 440	Liner, .023-.035
15	110 784	· Collet, .023-.035
16	079 974	O-Ring, .500
17	110 796	Connector
18	047 994	Terminal

♦ OPTIONAL

Figure 6-2. GA-16C1 Gun (Fig 6-1 Item 51)

Table 6-1. Suggested Welding Settings

Wire Type, Shielding Gas, And Flow Rate	Wire Diameter (inch)	Operator Control Settings*	Metal Thickness						
			1/8 in. (3.2 mm)	12 ga.	14 ga.	16 ga.	18 ga.	20 ga.	22 ga. And Thinner
E-71T-GS Flux Core	0.030	Voltage Wire Speed	4 30	3 30	3 20	1 25	1 20	1 20	– –
	0.035	Voltage Wire Speed	4 30	3 25	2 25	1 25	1 25	1 20	– –
ER70S-6, Mild Steel, CO_2, 20 cfh+	0.023	Voltage Wire Speed	4 50	4 50	3 50	2 45	2 40	1 30	1 30
	0.030	Voltage Wire Speed	4 40	4 40	3 40	3 40	2 40	1 40	1 35
ER70S-6, Mild Steel, 75% Argon 25% CO_2, 20 cfh+	0.023	Voltage Wire Speed	4 60	4 55	3 50	2 45	2 40	1 35	1 35
	0.030	Voltage Wire Speed	4 50	4 50	3 50	3 50	2 45	1 45	1 40
ER 308, Stainless Steel, Tri-Mix, 20 cfh+	0.023	Voltage Wire Speed	4 40	4 35	4 35	3 30	3 30	2 20	– –
	0.030	Voltage Wire Speed	4 30	4 30	4 30	3 25	3 20	2 15	– –
	0.035	Voltage Wire Speed	4 15	4 15	4 15	3 15	2 15	– –	– –
Aluminum, Argon, 30 cfh+	0.030	Voltage Wire Speed	– –	4 85	3 80	2 75	1 70	– –	– –
	0.035	Voltage Wire Speed	– –	4 55	4 60	2 60	2 55	– –	– –

*Do not change VOLTAGE switch position while welding. WIRE SPEED value in table is a starting value only, and WIRE SPEED control setting can be fine tuned during welding.

+cfh = cubic feet per hour

MILLER'S TRUE BLUE® LIMITED WARRANTY

Effective January 1, 1995
(Equipment with a serial number preface of "KD" or newer)

This limited warranty supersedes all previous MILLER warranties and is exclusive with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY – Subject to the terms and conditions below, MILLER Electric Mfg. Co., Appleton, Wisconsin, warrants to its original retail purchaser that new MILLER equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped by MILLER. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

Within the warranty periods listed below, MILLER will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. MILLER must be notified in writing within thirty (30) days of such defect or failure, at which time MILLER will provide instructions on the warranty claim procedures to be followed.

MILLER shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the date that the equipment was delivered to the original retail purchaser, or one year after the equipment is sent to a North American distributor or eighteen months after the equipment is sent to an International distributor.

1. 5 Years Parts – 3 Years Labor
   - Original main power rectifiers
   - Inverters (input and output rectifiers only)
2. 3 Years — Parts and Labor
   - Transformer/Rectifier Power Sources
   - Plasma Arc Cutting Power Sources
   - Semi-Automatic and Automatic Wire Feeders
   - Inverter Power Supplies
   - Intellitigs
   - Robots
3. 2 Years — Parts and Labor
   - Engine Driven Welding Generators
     (NOTE: Engines are warranted separately by the engine manufacturer.)
   - Air Compressors
4. 1 Year — Parts and Labor
   - Motor Driven Guns
   - Process Controllers
   - IHPS Power Sources
   - Water Coolant Systems
   - HF Units
   - Grids
   - Spot Welders
   - Load Banks
   - SDX Transformers
   - Running Gear/Trailers
   - Plasma Cutting Torches (except APT, ZIPCUT & PLAZCUT Models)
   - Tecumseh Engines
   - Deutz Engines (outside North America)
   - Field Options
     (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
5. 6 Months — Batteries
6. 90 Days — Parts and Labor
   - MIG Guns/TIG Torches
   - APT, ZIPCUT & PLAZCUT Model Plasma Cutting Torches
   - Remote Controls
   - Accessory Kits
   - Replacement Parts

MILLER'S True Blue® Limited Warranty shall not apply to:

1. Items furnished by MILLER, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
2. Consumable components; such as contact tips, cutting nozzles, contactors and relays or parts that fail due to normal wear.
3. Equipment that has been modified by any party other than MILLER, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

MILLER PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at MILLER'S option: (1) repair; or (2) replacement; or, where authorized in writing by MILLER in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized MILLER service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer's risk and expense. MILLER'S option of repair or replacement will be F.O.B., Factory at Appleton, Wisconsin, or F.O.B. at a MILLER authorized service facility as determined by MILLER. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT TORT OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MILLER IS EXCLUDED AND DISCLAIMED BY MILLER.

Some states in the U.S.A. do not allow limitations of how long an implied warranty lasts, or the exclusion of incidental, indirect, special or consequential damages, so the above limitation or exclusion may not apply to you. This warranty provides specific legal rights, and other rights may be available, but may vary from state to state.

In Canada, legislation in some provinces provides for certain additional warranties or remedies other than as stated herein, and to the extent that they may not be waived, the limitations and exclusions set out above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary from province to province.

RECEIVING-HANDLING

Before unpacking equipment, check carton for any damage that may have occurred during shipment. File any claims for loss or damage **with the delivering carrier**. Assistance for filing or settling claims may be obtained from distributor and/or equipment manufacturer's Transportation Department.

When requesting information about this equipment, always provide Model Designation and Serial or Style Number.

Use the following spaces to record Model Designation and Serial or Style Number of your unit. The information is located on the rating label or nameplate.

Model _____

Serial or Style No. _____

Date of Purchase _____